

LISTING OF CLAIMS:

This listing of claims will replace all prior versions of claims in the application:

- 1 1. (Original) A method for manufacturing a magnetoresistive sensor comprising:
 - 2 providing a substrate;
 - 3 forming a photoresist mask over a desired sensor area;
 - 4 depositing a magnetic hard bias material;
 - 5 removing said photoresist mask;
 - 6 depositing a plurality of sensor layers as full film layers; and
 - 7 chemical mechanical polishing sufficiently to remove portions of said sensor
 - 8 layers formed outside said sensor area.
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- 10 2. (Original) A method as in claim 1 wherein said plurality of sensor layers includes
- 11 a free layer, said method further comprising:
 - 12 before forming said photoresist mask and before depositing said hard bias
 - 13 material, depositing a dielectric material of such a thickness that said hard bias
 - 14 material will align with said free layer.
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- 2 3. (Original) A method as in claim 2 further comprising, after removing said
- 3 photoresist mask, performing a material removal process to remove portions of said
- 4 dielectric material not covered by said hard magnetic material.

1 4. (Original) A method as in claim 2 further comprising, after removing said
2 photoresist mask, performing a reactive ion etch (RIE)

1 5. (Original) A method as in claim 2, wherein said dielectric material comprises
2 SiO₂.

1 6. (Original) A method as in claim 1, wherein said substrate is a magnetic,
2 electrically conductive material.

1 7. (Original) A method as in claim 1, further comprising, after depositing said hard
2 magnetic material, depositing an electrically insulating material.

1 8. (Original) A method as in claim 1, further comprising, after removing said
2 photoresist mask, depositing a dielectric material, and then performing a reactive ion etch
3 to remove horizontally disposed portions of said dielectric material.

1 9. (Original) A method as in claim 8 wherein said dielectric material comprises
2 SiO₂.

1 10. (Original) A method of manufacturing a current perpendicular to plane (CPP)
2 magnetoresistive sensor, comprising:
3 forming a first electrode;

4 depositing a first full film layer of electrically insulating material onto said first
5 electrode;
6 forming a photoresist mask over a desired sensor area;
7 depositing an electrically conductive seed layer;
8 electroplating a magnetic, high coercivity hard bias material onto said seed laeyr;
9 depositing a second electrically insulating layer;
10 removing said photoresist mask;
11 depositing SiO₂, conformally to cover horizontal and non-horizontal surfaces;
12 perform a reactive ion etch (RIE).
13 depositing a plurality of full film sensor layers;
14 performing a chemical mechanical polishing (CMP) process; and
15 depositing a second electrode

1 11. (Original) A method of manufacturing a magnetoresistive sensor, comprising:
2 providing a substrate;
3 forming a photoresist mask in a sensor area, said mask having first and second
4 laterally opposed sides;
5 depositing a magnetic material, at least a portion of said magnetic material
6 defining first and second magnetic layers extending from said laterally opposed
7 sides of said mask;
8 removing said photoresist mask to define a trench between said first and second
9 magnetic layers; and

10 depositing sensor material layers, at least a portion of said sensor material layers
11 being deposited in said trench.

1 12. (Original) A method as in claim 11 further comprising, after depositing said
2 sensor material layers, performing a chemical mechanical polishing process to
3 remove portions of said sensor material disposed outside of said trench.

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2 13. (Original) A method as in claim 12 further comprising, after depositing said
3 magnetic material, depositing a physically hard insulating material layer.

1 14. (Original) A method as in claim 13 wherein said physically hard insulating
2 material layer is alumina (Al_2O_3).

1 15. (Original) A method as in claim 13 wherein said physically hard insulating
2 material layer is diamond like carbon (DLC).

1 16. (Original) A method as in claim 13, wherein said physically hard insulating
2 material layer is SiO_2 .

1 17. (Original) A method for manufacturing a magnetoresistive sensor, comprising:
2 providing a first electrode having an upper surface;
3 depositing a layer first layer of SiO_2 onto said upper surface of said electrode;
4 forming a photoresist mask on said first layer of SiO_2 ;

5 depositing an electrically conductive seed layer;
6 depositing a high coercivity magnetic material onto said seed layer;
7 depositing a physically hard insulating material;
8 depositing a second layer of SiO₂;
9 performing a reactive ion etch process;
10 depositing sensor material layers;
11 perform a chemical mechanical polishing process; and
12 depositing an electrically conductive material to form a second electrode.

13 18. (Withdrawn) A magnetic head comprising:
14 a first electrode;
15 a magnetoresistive sensor having first and second laterally opposed sides
16 and formed upon said first electrode;
17 first and second electrically insulating walls formed at said first and second sides
18 of said sensor;
19 first and magnetic hard bias layers extending laterally outward from said first and
20 second walls;
21 first and second physically hard electrically insulating layers formed over said
22 first and second hard bias layers; and
23 a second electrode formed over said sensor and said physically hard electrically
24 insulating layers.

1 19. (Withdrawn) A magnetic head as in claim 18, wherein said physically hard
2 electrically insulating layers comprise alumina (Al_2O_3).

1 20. (Withdrawn) A magnetic data memory system, comprising:
2 magnetic disk;
3 a motor connected with said disk rotating said disk;
4 a slider;
5 an actuator connected with said slider to position said slider adjacent said disk;
6 a magnetic sensor connected with said slider, said sensor comprising:
7 a first electrode;
8 a magnetoresistive sensor having first and second laterally opposed sides
9 a and formed upon said first electrode'
10 first and second electrically insulating walls formed at said first and
11 second sides of said sensor;
12 first and magnetic hard bias layers extending laterally outward from said
13 first and second walls;
14 first and second physically hard electrically insulating layers formed
15 over said first and second hard bias layers; and
16 a second electrode formed over said sensor and said physically hard
17 electrically insulating layers.
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